UNITED STATES AERONAUTICS AND SPACE ACTIVITIES, 1963

MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

A REPORT FOR THE CALENDAR YEAR 1963, ON THIS NATION'S AERONAUTICS AND SPACE ACTIVITIES, PURSUANT TO THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958, AS AMENDED

JANUARY 27, 1964.—Referred to the Committee on Science and Astronautics and ordered to be printed with illustrations

U.S. GOVERNMENT PRINTING OFFICE
27-856 O WASHINGTON : 1964

Page Not Available

Chapter IV
Department of Defense

INTRODUCTION

During 1963 the Department of Defense (DOD) sustained a comprehensive effort to advance and exploit those space and aeronautics technologies important to national defense posture. Over 20 percent of the funds spent for all Defense research and engineering programs were spent on military space activities.

About half of the military space effort - measured in dollar expenditures - is directed toward the development of hardware to meet firm military needs. The remainder is devoted to the development and maintenance of a base of supporting technology, techniques, and experience intended to sustain a flexible, responsive capability to move rapidly into future system development programs as future needs evolve.

This year was marked by a substantial growth in the reservoir of military space flight experience. Accompanying this experience is a growing inventory of space-proven hardware on which flight data are available and from which components, systems, and subsystems can be drawn for application to future programs. The space environment has become well enough understood to permit spacecraft design with confidence. Test and simulation techniques, equipments, and facilities have been developed which permit a greater emphasis and reliance on ground, aircraft, and other test and evaluation programs before commitment to orbital flight. With the fundamentals increasingly well in hand, greater attention is being directed to putting space technology to work and the balance of emphasis is shifting from the past need to explore to a growing competence to exploit. Continuing progress is being made with program management techniques, and with cost estimating. There is a growing expertise in cost-effectiveness analysis as it applies to military space systems and a firmly seated conviction that to merit support, space programs must compete favorably when weighed impartially against other feasible alternatives in the context of overall military needs for the present and the future.

Finally, there is wide recognition that the nation's space activities must be measured from a national rather than a departmental standpoint. Just as there are many Defense programs providing direct support to other agencies, so are the research and development efforts of the National Aeronautics and Space Administration, as well as those of other agencies such as the Atomic Energy Commission and the Weather Bureau of the Department of Commerce, providing hardware and know-how of importance to military needs. Prime examples are the NASA GEMINI program where the DOD and NASA are engaged in a joint manned space flight enterprise as well as the space nuclear power programs of the AEC and the Weather Bureau's weather satellite program. Undoubtedly, the scope and magnitude of the Defense Department's space efforts would be substantially larger if it were not for the programs of other agencies.

The year 1963 witnessed both progress and delays in achieving military space capabilities. During the year a DOD satellite was stabilized, for the first time, by utilizing gravity gradient techniques. Also, the first satellites entirely powered by nuclear energy were placed in orbit. With the launch of two identical satellites in the

fall of this year, significant steps were taken toward the development of the equipment and techniques for the detection of nuclear tests in space by satellite-borne instruments. The feasibility of voice, teletype, and high speed digital communications by passive relay via a belt of orbiting dipoles was successfully demonstrated. On the other hand, rendezvous with, and inspection of, unidentified satellites still appears technically difficult and there still remain unanswered questions regarding the technical feasibility, complexity, and cost-effectiveness of a spaceborne ballistic missile alarm system.

A significant step toward future manned space flight capabilities was taken in December with the decision to proceed with the development of a Manned Orbiting Laboratory (MOL). The MOL program will exploit equipment and facilities already under development in the DOD's TITAN III and NASA's GEMINI programs to provide an early, straightforward approach to the problems of exploring and developing man's potential for performing military missions in space. In corollary actions taken to provide a more economical and effective allocation of efforts and resources, the X-20 (DYNASOAR) program was terminated and the unmanned vehicle program for the research and development of the techniques and technology of advanced reentry and precision recovery was substantially augmented, both in emphasis and scope.

Continuing progress was made in strengthening inter-agency ties at both the management and operating levels in DOD and NASA and several important agreements were reached which establish terms of reference for further collective effort. Among these are agreements covering the GEMINI, Navigational Satellite, AGENA D and Thrust-Augmented THOR programs, a possible new manned earth orbital research and development project, the management and operation of the Atlantic Missile Range (DOD/Merritt Island Launch Area (NASA)), and ship support for APOLLO. Such agreements will further facilitate the conduct of a fully integrated national space program properly addressed to all national needs.

Although not accorded the public attention focussed on space activities, aeronautics programs continue to figure importantly in Defense interests and capabilities. Continuing, and significant, progress was also made in this area during the past year.

Accordingly, selected elements of the DOD program in both of these areas are highlighted in the following sections:

SPACE DEVELOPMENT ACTIVITIES

TITAN III

The TITAN III Standardized Space Launch System is being developed by the Air Force as a part of the National Launch Vehicle Program of the DOD and the NASA. This booster uses a modified TITAN II missile as the basic building block. A pair of 120-inch diameter segmented solid motors give over two million pounds of lift-off thrust. A new pressure-fed upper stage, capable of multiple restarts after long coast periods in space, will provide the propulsion versatility needed for very high orbits, escape missions, and precise control of orbital plane or altitude changes. The low altitude payload weight capability of the TITAN III configurations ranges from 5,000 to 25,000 pounds. Over a ton of payload can be injected into a stationary orbit.

After more than a year of program definition effort, the development phase was started on 1 December 1962. The first full-size five-segment solid motor was test-fired on

schedule in July 1963. The performance of the liquid injection thrust vector control exceeded expectations. The new twin engine propulsion unit for the upper stage was successfully tested, also in July, in a long duration firing with programmed shutdowns and restarts. A new facility at Edwards Air Force Base for testing the solid motors has been completed. At Cape Kennedy, billions of cubic yards of fill were pumped to create new islands in the Banana River. On these, construction of the new Integrate-Transfer-Launch facility is well on the road. In addition to the new complex, a conventional ICBM launch pad has been modified to support the early test flights of TITAN IIIA. The first flight is scheduled to take place in the third quarter of 1964.

Manned Orbiting Laboratory (MOL)

In December the Secretary of Defense assigned to the Air Force a new program for the development of a near-earth Manned Orbiting Laboratory (MOL).

The MOL system will consist of a modified GEMINI capsule coupled to a pressurized laboratory cylinder of approximately 1500-2000 cubic feet of volume configured as an orbiting laboratory, to be launched integrally on a TITAN IIIC. Astronauts will be seated in the GEMINI capsule during launch and will move into the laboratory after injection into orbit. After completion of their tasks in space, the astronauts will reenter the GEMINI capsule, detach, and deorbit, leaving the laboratory cylinder in orbit. The GEMINI capsule being developed by NASA for use in the Lunar Program will be appropriately modified to provide in-orbit access to the laboratory as well as to perform other functions necessary to support the MOL. While not required in the early stages of the program, rendezvous provisions will be designed into the MOL so that the laboratory could later be resupplied and reused if justified by progress made in defining man's military role in space.

The MOL program will be directed specifically to fulfilling the need for an early, effective demonstration of man's utility in performing military functions in space. This must be accomplished before realistic specifications can be drawn for any potential operational manned system.

The MOL program is not aimed at a military operational system, or even to an orbiting manned space station capability in the context usually attributed to that term. Rather, it will be designed to provide a minimal but substantive assessment of the feasibility and effectiveness of manned operations in orbit which may later be used to specify operational design characteristics and performance parameters. The first manned flight of the MOL is expected late in 1967 or early in 1968.

In initiating the MOL program, it was decided to terminate the X-20 (DYNASOAR) program because of its limited utility as an in-space test facility and because the exploration of the hypersonic flight regime and the development of maneuverable reentry and recovery techniques - which X-20 was primarily designed to do - are of lesser priority and can be more economically conducted in a program of unmanned lifting reentry vehicles. X-20 was directed to demonstrating the feasibility of a specific design of a radiative-cooled structure with a hypersonic lift-to-drag ratio of about 1.7. The development of a weapon system, or prototype of a weapon system, was not one of the X-20 objectives.

It is planned to broaden the DOD's unmanned vehicle program (ASSET) for the research and development of reentry and recovery techniques and technology to embrace a wider range of reentry conditions, materials, structures, and techniques than previously

included in either X-20 or ASSET. Much of the X-20 development experience - particularly the wind tunnel testing, aerodynamics, structures design, and materials improvements - will be directly applicable to this augmented effort.

As the development for the MOL proceeds, continued joint participation by DOD and NASA will be involved: in assessing compatible scheduling between DOD and NASA manned space flights, to facilitate the common usage of range and ground support equipment and launch tracking and control facilities, to incorporate NASA experiments in the MOL while meeting priority military requirements, and in planning and conducting a mutually interdependent effort for the exploration of hypersonic reentry characteristics and subsonic landing and handling qualities of representative lifting reentry vehicles.

Communications Satellite Programs

The immediate objective of the Defense Communications Satellite Program (DCSP), as reoriented by the Secretary of Defense in May 1962, is to provide a worldwide communications system utilizing active medium-altitude random-spaced satellites in polar orbits, with ground stations so located as to satisfy the operational requirements of the Defense Communications System. Under the integrating direction of the Defense Communications Agency, the Air Force has responsibility for the satellites and launch vehicles and the Army is responsible for the surface environment to be comprised of fixed and transportable terminals.

In January 1963 a request for proposal for the Program Definition Phase of the Medium Altitude Communication Satellite Development Program was distributed to 36 potential contractors. Seven contractors responded. The names of the two successful bidders were released on 13 May 1963. The purpose of the Program Definition Phase was to determine feasibility and acceptability of continuing with the development program. The study was completed on 30 July 1963.

The medium altitude system would involve four series of six to eight satellites, weighing approximately 100 pounds each, in random polar orbits. Approximately 24 satellites in four orbital planes, spaced 45° apart, will provide global communication coverage. Initial launches will employ spin stabilized satellites. Studies are now being conducted on the feasibility of phasing in gravity gradient stabilized satellites at a later date.

The DOD TRADE POST test program was continued in order to determine: The technical capabilities of a ground station complex which is compatible with at least two different concepts of communications satellites; the requirements for operation, maintenance, personnel, and logistic support; and the operational data to aid in planning future military communication satellite systems. Both military and commercial ground terminals and all available communications satellites - SYNCOM, TELSTAR, RELAY - were employed in carrying out this evaluation.

In addition, a continuous program of supporting development is being conducted to advance the design of satellite communications surface complexes as the state of the art progresses. These efforts generally lead from studies through component and subsystem development to actual hardware fabrication and integration. Included are investigations in such areas as multiple access, anti-jamming, communication vulnerability, improved radio frequency components, optimized antenna designs,

puter programming for satellite communications scheduling, and transportable minals.

Project WEST FORD

Project WEST FORD is a communications experiment designed to place 50 pounds of pper hair-like filaments (dipoles) into orbit in a belt around the earth for the purpose

a. Investigating the technical feasibility of utilizing orbiting dipoles as passive reflectors for relaying communications.

b. Providing an opportunity for an objective assessment of the possible effects of the dipole technique on space activities or any branch of science.

The WEST FORD package was launched on 9 May 1963, and injected into orbit from the parent satellite on 10 May. The first observation of belt dispersal was made on 12 May. The dipole belt closed on 18 June 1963. Its width is about ten miles wide and 20 miles thick at an altitude of approximately 2,000 miles.

This experiment was very successful. Voice, teletype, and high speed digital data communications were transmitted between Camp Parks, Calif., and Westford, Mass. Observations and measurements are continuing in order to provide a detailed analysis and evaluation of this experiment.

In accordance with the Presidential Policy Statement of August 1961, the U.S. will plan no further launches of orbiting dipoles until after the results of the first WEST FORD experiment have been analyzed and evaluated. The scientific community will be advised of the government's plans before conducting further experiments of this nature.

Inspector

Work continued this year on various aspects of the satellite inspection problems. DOD/NASA detailed plans for performance of selected experiments on GEMINI flights are nearing completion. Conceptual preliminary design studies are under way to define a spacecraft capable of co-orbital inspection of non-cooperative satellites. Further efforts toward an unmanned prototype co-orbital demonstration have been suspended pending the completion of those studies.

ICBM Alarm

The objective of this program is the research and development of a space-based attack alarm system intended to maintain continuous surveillance over ballistic missile launches on a global basis. Such a system would consist of unmanned satellites carrying infrared sensors which can detect ballistic missiles in powered flights as they emerge from the atmosphere. During 1963, several technical advances were made in furthering this development as the flight test program was directed toward the actual detection of live ballistic missile launches. Two flights were conducted on which a number of in-space detections were made of both liquid-fueled and solid-fueled ICBM launches from AMR and PMR.

27-856 O-64—4

ANNA 1B

The ANNA 1B Geodetic Satellite launched on 31 October 1962 experienced early equipment failures that affected the power supply and by January 1963 the intensity of the flashing light experiment was reduced to about 25 percent of original level. The original observation program had to be abandoned in favor of a small camera network operating in the United States only. In July 1963 the power supply trouble disappeared and the light intensity came back to normal if used for about eight to ten flash sequences per day. With the limited revival of the light, a program has been formed to use ANNA 1B to determine the accuracy of long base-line surveys by satellite light techniques. The analysis of doppler and other data is continuing and the ANNA satellite has contributed materially to a better definition of the earth's gravitational field and to the improvement of world mapping accuracies.

On 13 December 1962 the DOD and NASA executed an agreement on Project ANNA which prescribed the division of responsibility which obtains from ANNA I as well as for a follow-on ANNA program. Overall project management for such follow-on programs as may be required rests with NASA. The DOD will participate as necessary to provide and operate certain ground tracking equipment to assist with data processing and analysis.

Large Solid Propellant Motor Program

In accordance with an agreement between the DOD and the NASA, the Air Force is carrying out a program to advance the technology and demonstrate the feasibility of very large solid motors. With segmented motors 120 inches in diameter already under development for TITAN III, this program has progressed in the past year to larger sizes, specifically 156-inch and 260-inch diameters. The practical limit for overland transportation by road or rail is 156 inches. There is no current DOD interest in a solid motor larger than this size.

A monolithic motor approximately 260 inches in diameter may have application to first stage use in very large NASA launch vehicles capable of orbiting payloads weighing hundreds of thousands of pounds; a motor of this size would require water transportation from the manufacturing plant to launch site. The two-year program initiated by the Air Force in mid-1963 should result in static firing tests of motors in both of these sizes from early in 1964 to mid-1965.

In support of NASA's interests, the DOD program includes four half-length 260-inch motors firings at new contractor-owned fabrication and test facilities on waterways in the Southeast convenient to Cape Kennedy. Should NASA's requirements dictate, successful demonstration of these sub-length motors at the three-million pound thrust level could subsequently lead to development of flight-qualified full size motors delivering about seven million pounds of thrust. In direct support of the 260-inch effort, a two-segment 156-inch motor will be used to test a three-million-pound nozzle and simulate the propellant grain design of the larger motor. Single segment 156-inch motors will be used in tests of mechanical thrust vector control methods at the one-million-pound thrust level. One of these methods uses a single large movable nozzle; the other, jet tabs. Concurrently with these tasks a general technology effort is being conducted which includes work on nozzle and case materials, fabrication processes, alternate methods of thrust termination and thrust vector control, ground handling equipment, high burn rate propellants, and high chamber pressures.

Navigational Satellite Program

The Navigational Satellite Program proceeded as planned during 1963. Ground based tracking, computation, and injection stations are in place and operating. Operational prototype satellites are being launched. Shipboard navigational equipment has been installed and operational evaluation of the system is under way. In February 1963 a DOD/NASA agreement was reached which provides that responsibility for governmental determination of the suitability of Navy-developed navigational equipment to meet non-military requirements, as well as responsibility for the development of non-military navigational equipment, rests with NASA. The DOD (Navy) retains responsibility for the development, technical direction, and operation of the satellite system per se, its associated ground environment, and for the development of military navigational equipment.

Spaceborne Nuclear Detection

The nuclear detection satellite program is a joint AEC-DOD research and development effort concerned with the detection of nuclear tests in space by satellite-borne instruments. The satellites developed under this program are designed to provide data on the operation of nuclear test detection sensors in space, and information on the natural radiation environment in which the sensors must function.

The first launch of this program occurred during the fall of 1963. Two identical experimental satellites, equipped with X-ray, gamma-ray and neutron detectors, were launched in tandem and placed into virtually identical near-circular orbits beyond most of the particle trapped in the earth's magnetic field. The two satellites were injected into their final orbits to maintain an almost constant separation of about 100,000 miles.

A large amount of data on radiation background has been received. These data will be used to design improved worldwide test detection systems of the future. In addition, the satellites are providing data of considerable general scientific value for the study of solar and galactic radiation.

Additional launches, each with two satellites, are scheduled in this series.

SPACE GROUND SUPPORT

Space Detection and Tracking System (SPADATS)

This system is under the operational control of the North American Air Defense Command (NORAD) and consists of three major elements. SPACETRACK, operated by the USAF Air Defense Command (ADC) is a globally dispersed system of long range radars and optical device plus a computer center at Colorado Springs. SPASUR, and interferometer fence across the southern U.S., is operated by the Navy. The third element, a full computer backup for Colorado Springs, is located at L. G. Hanscom Field and manned by a detachment of ADC.

During the past year SPACETRACK has been improved by the addition of a tracking radar in Diyarbekir, Turkey, and the completion of BMEWS Site III at Fylingdales, United Kingdom. Significant progress has also been made in automating the data processing throughout the entire system.

DOD National Ranges

The Department of Defense's National Range complex consists of the Atlantic Missile Range (AMR), Pacific Missile Range (PMR), and the White Sands Missile Range (WSMR). The capabilities of this complex continue to grow at a pace set by the ever-increasing data needs of the DOD missile programs and the nation's expanding space program. Capabilities added during the past year include highly instrumented new tracking ships, improved radars and precision tracking systems, additional communications capacity, and various minor improvements. Global satellite tracking and control facilities have been expanded and are now capable of simultaneous control of multiple orbiting vehicles. DOD space operations have increased to the extent over the past year that one or more active satellites requiring active control is now in orbit at all times.

In November the Secretary of Defense directed a number of changes regarding management of the DOD's missile test ranges and space launch and tracking facilities. The principal changes include:

a. The establishment of a single manager, within the Air Force, to coordinate and conduct the planning of ICBM and space vehicle tracking activities at: AMR, Point Arguello and Vandenberg AFB, and the Air Force Satellite Control Facility, Sunnyvale.

b. Transfer of the Navy-managed facility at Point Arguello to the Air Force.

c. Clarification of the responsibilities for on-orbit control of DOD satellites by assigning this function to the Air Force.

d. The initiation of action to transfer the anti-missile test support facilities at Kwajalein from the Navy to the Army, and the transfer, from the Navy to the Air Force, of the PMR space tracking stations.

These and other related changes are expected to improve the overall management of the facilities involved since responsibilities which previously overlapped have been clarified and ICBM and space support facilities are now to be managed by one central authority.

At AMR two new ships (modified C-4 hulls, renamed the General H. H. Arnold and the General Hoyt S. Vandenberg) have been added, augmenting the United States' already extensive mobile, seaborne radar tracking and telemetry capability. The ships will be used in support of the missile development programs and could be used in support of space projects. Also at AMR the electronic tracking capability has been enhanced with the installation of new, large, hi-power tracking radars with a greatly increased range and accuracy performance. A tracking system of extremely high precision, the Missile Trajectory Measurement (MISTRAM) has been put into operation up-range. It is supplemented by another new system, Global Tracking (GLOTRAC) which is mobile and has extensive coverage. A new submarine cable has been installed between Grand Turk Island in the Bahamas and Antigua. This provides an extension of high density wide-band communication capability over the critical first 1500 miles of the range. This increased capacity permits much greater flexibility of operation. Better range control results, but more importantly, project support is enhanced because of the ability to transmit real time tracking and telemetry

data back to Cape Kennedy as well as the transmission of vehicle control signals down-range.

Launch rates of large space boosters and missiles from the Point Arguello/Vandenberg complex of PMR tripled during this year. An important element of the PMR increase overall was the NIKE ZEUS AICBM tests which reached a peak level of activity. Highlighting over one hundred and forty other programs supported by the PMR were the successful launching of a DOD sateilite containing an AEC-developed nuclear power plant, and the support of the MERCURY MA-9 flight. The MA-9 capsule and astronaut Cooper were recovered by the aircraft carrier Kearsarge in an area near Midway Island. Land tracking, instrumentation, and telemetry facilities at Canton Island, Kokee Park, Hawaii, and at Point Arguello, California provided the necessary support for the MA-9 operation. The USNS Wheeling, T-AGM-8 is being converted to an instrumentation ship and next year will join the group of PMR ships which are now assisting in obtaining data from satellites and missiles over wide ocean areas. Other important additions to communications, tracking, range safety, and multiple countdown facilities at PMR continue to be made.

At WSMR design and construction of the NASA-operated APOLLO Propulsion Development Facility was initiated. Modification of test stands and other support facilities for tests of APOLLO abort systems was completed permitting initial flight tests of the SATURN booster simulator (LITTLE JOE II). By the end of the third calendar quarter, WSMR was planning or providing range support for a total of 159 air, space, and missile project programs.

Rocket Engine Test Facility

In December 1963 the Air Force Systems Command completed construction at Arnold Engineering Development Center of the largest simulated altitude rocket test facility in the free world. This facility will permit testing of 500,000-pound thrust rocket engines under simulated altitude environments. The facility, which supports national booster programs, has the potential of being modified to permit testing of boosters developing 1.5 million pounds thrust.

AERONAUTICS DEVELOPMENT ACTIVITIES

Helicopter and V/STOL Development

Fixed-wing aircraft currently in the inventory have good characteristics for landing and taking off from short, unimproved surfaces. Currently available helicopters are comparatively efficient in vertical take-off, hovering and at low speeds. However, the flexibility of fixed-wing aircraft is still limited by their dependence on landing areas, and the helicopters are limited in stability, lift capability, range and speed. Therefore, the DOD is pursuing a development program with the twin goals of improving the helicopter and developing vertical and short landing and take-off (V/STOL) aircraft which are completely responsive to combat area requirements of the ground combat forces.

Helicopter development has included flight or wind-tunnel tests of rigid, semi-rigid and teetering rotors in speed ranges up to 160 knots. In 1962, the Navy, in cooperation with the Army, initiated a rigid rotor research helicopter program. The purpose of this effort was to determine if a simplification could be made in the helicopter program. The purpose of this effort was to determine if a simplification could

Page Not Available

DOD/NASA Agreements

Major DOD/NASA formal agreements were concluded during the year concerning the following:

a. Management and Operation of the Atlantic Missile Range (DOD) and the Merritt Island Launch Area (NASA)

b. The GEMINI Program

c. The TRANSIT Navigational Satellite Program

d. The AGENA D Program

e. The Thrust Augmented THOR-DELTA Launch Vehicle Program

f. A possible joint program for a manned orbital space station

g. The DOD Manned Orbiting Laboratory (MOL) Program.

DOD Participation in the GEMINI Program

On 21 January 1963, NASA and DOD entered into the agreement cited above designed to insure the greatest national benefit from the GEMINI Program. A joint GEMINI Program Planning Board was formed to administer the agreement. In May, the Board recommended to the Secretary of Defense and the Administrator of NASA a plan for DOD experiments to be performed on NASA's flights. In June the Secretary of Defense approved: (1) A program of "piggyback" experiments on NASA flights along the lines recommended by the Board; (2) the manning of an Air Force Field Office at Houston to manage the integration of DOD experiments into the NASA program; and (3) the assumption by DOD of the costs associated with improving the TITAN II booster for the GEMINI program. A development plan for the experimental program has been prepared by the Air Force, working with the Army, the Navy, and NASA's Manned Spacecraft Center.

Active DOD participation in the NASA GEMINI Program facilitates the flow of information between DOD and NASA, insures more complete use of experience gained in manned space flight activities, and minimizes the possibility of duplication within the National Space Program. Data derived from this program are expected to be useful for the MOL development and operation.

Orbital Space Station

On 16 September 1963 Secretary McNamara and Administrator Webb signed the agreement concerning a possible new project in the area of manned earth orbital research and development vehicles.

As pointed out in the agreement, since a large orbital space station would be a major technical and financial undertaking, the requirements of all government agencies should, insofar as practicable, be met in a single national program.

Both NASA and DOD will continue advanced and exploratory studies to develop data on agency requirements, possible new design concepts, feasibility, and costs. These

studies are to be coordinated through the Aeronautics and Astronautics Coordinating Board (AACB) which will evaluate the various advanced space station concepts. Acting upon the evaluations of the AACB, and in the light of the experience gained in GEMINI, MOL, and APOLLO, the Secretary of Defense and the Administrator of NASA will, at an appropriate time in the future, address a joint recommendation as to whether to proceed with a new national program in this area.

Manned Orbiting Laboratory (MOL) Program

DOD and NASA worked together in defining the MOL program and NASA concurred in the DOD decision to proceed. It was agreed that the MOL is not a national space station program in the context of the Webb/McNamara agreement of September 1963, but, rather, is a specific experimental test bed for certain potential military space applications not within the scope of NASA's activities. It was agreed, however, that NASA projects would be considered for test in the MOL on a non-interference basis in order that NASA might take full advantage of the research and development opportunities presented by the program.

Both agencies have agreed that a joint coordinating board should be established to advise and pass on recommendations to DOD and NASA top management concerning such GEMINI/MOL interagency interfaces as: common use of launch facilities, checkout equipments, control centers, and range support, as well as the accommodation of NASA experiments in the MOL.

Both agencies have agreed that major savings could be realized in the next year by terminating the DOD's X-20 program and orienting effort in the MOL direction. To provide the technical data needed for the design of possible future operational lifting reentry vehicles, DOD and NASA have agreed to coordinate in the planning and conduct of an accelerated program for the exploration of hypersonic reentry characteristics and subsonic handling and landing characteristics of representative reentry spacecraft.

Life Sciences/Bioastronautics

The Bioastronautics/Life Sciences programs of the Air Force and the National Aeronautics and Space Administration (NASA) were involved in several joint management actions during the past year.

The Manned Space Flight Panel of the Aeronautics and Astronautics Coordinating Board (AACB) completed a "Report on Air Force/NASA Space Station Coordination" in July 1963, in which Air Force and NASA representatives put forth a jointly approved plan for effective participation.

The Supporting Space Research and Technology (SSRT) Panel of the AACB has established a Life Sciences Sub-panel. This group, with members from the three military departments and the NASA, has formally addressed the problem of achieving effective coordination of Life Sciences/Bioastronautics effort with specific emphasis on eliminating duplication of effort. In achieving these goals, the sub-panel has arranged for the exchange of project data cards and task descriptions between the Office of Advanced Research and Technology (NASA) and the Aerospace Medical Division at Brooks Air Force Base, Texas, the latter of which has management responsibility for the Air Force Bioastronautics/Life Sciences program. This exchange will result

27-856 O-64—5

Page Not Available

Chapter VI
Department of State

INTRODUCTION

Brought to fruition in 1963 were the protracted negotiations of a number of international agreements of worldwide interest and great importance. Particularly noteworthy were the approval by acclamation by the United Nations of a resolution which welcomed the expressions of the United States and the Soviet Union of their intentions not to station any objects carrying nuclear weapons or other kinds of weapons of mass destruction in outer space and a second resolution, also adopted by the General Assembly, which called upon all States to become parties to the treaty, signed in Moscow on August 5, 1963 banning nuclear weapon tests in the atmosphere, in outer space and under water.

Many of the objectives proposed by the Department of State in past years also were brought to international agreement during 1963. Many of the proposals and recommendations tabled in the Outer Space Committee of the U. N. by the United States, i. e. scientific and technical cooperation and legal principles, were adopted unanimously by the General Assembly of the United Nations.

The final actions of the Extraordinary Administrative Radio Conference on Space Communications, held under the auspices of the International Telecommunications Union, were in considerable measure responsive to United States desires on the allocation of frequency bands for space communications. Successfully negotiated at this conference were frequency bands for radio astronomy, meteorology, navigational satellites, aeronautical amateur services, scientific research, and most important, communications satellites.

Negotiated or in the process of negotiation on behalf of NASA, are the renewal of tracking station agreements with Mexico, Nigeria, Spain, the U. K. and Zanzibar.

U. N. RESOLUTIONS ON DISARMAMENT

RELATED QUESTIONS INVOLVING OUTER SPACE

On September 19, 1963, the Soviet Foreign Minister stated before the General Assembly that "the Soviet Government deems it necessary to reach agreement with the United States Government to ban the placing into orbit of objects with nuclear weapons on board," and expressed awareness that the United States took a positive view toward a solution of this problem. The following day President Kennedy, in his address to the Assembly, said: "We must continue to seek agreement, encouraged by yesterday's affirmative response to this proposal by the Soviet Foreign Minister, on an arrangement to keep weapons of mass destruction out of outer space."

On October 16, 1963 Committee I of the General Assembly, while considering the question of disarmament, approved by acclamation a resolution, cosponsored by all of the participants in the 18-Nation Committee on Disarmament, which (a) welcomed

the expressions by the United States and the Soviet Union of their intention not to station any objects carrying nuclear weapons or other kinds of weapons of mass destruction in outer space, and (b) called upon all States to refrain from placing such objects in orbit. The U. S. Ambassador, speaking before Committee I, recalled that this resolution set forth a policy which had already been adopted by the United States, and said that he was glad the intentions of the Soviet Union in this regard were the same as our own. While reaffirming the intentions of the United States, he made clear that "if events as yet unforeseen suggest the need for a further look at this matter, we would acquaint the United Nations with such events." The General Assembly adopted the resolution by acclamation in plenary session on October 17, 1963.

On November 27, 1963, the General Assembly adopted, by a vote of 104 in favor, one against (Albania) and three abstentions, a resolution which called upon all States to become parties to the treaty banning nuclear weapon tests in the atmosphere, in outer space and under water, which was signed on August 5, 1963 by the United States, the United Kingdom and the Soviet Union.

ACTIVITIES WITHIN THE UNITED NATIONS

Guidelines for United Nations activity in outer space for 1963 were laid down by General Assembly Resolution 1802 (XVII), adopted unanimously on December 14, 1962, on the initiative of the United States.

The Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, which met in Geneva from May 14 to 29, agreed upon a number of recommendations, including the following: (1) preparation by the U. N. Committee of a working paper on the activities of the United Nations and its specialized agencies relating to the peaceful uses of outer space and of a summary of national and co-operative international space activities based upon voluntary submissions; (2) compilation, in cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO), of information on facilities for education and training in basic subjects related to the peaceful uses of outer space in universities and other places of learning; (3) recommendation to Member States to give favorable consideration to requests of countries for training and technical assistance; and (4) establishment, at the request of the Government of India, of a group of scientists, to visit the sounding rocket launching site at Thumba and to advise the Committee on the acceptance of United Nations sponsorship. In addition, the Subcommittee reviewed reports of the International Telecommunication Union on space communications and the World Meteorological Organization (WMO) on its program involving satellite meteorology.

The Legal Subcommittee, which met in New York from April 16 to May 3, was unable to record any progress at that time. The United States and other members of the Committee urged the adoption of general legal principles to guide the conduct of States in outer space upon which there was already wide agreement. The Soviet Union, however, opposed any recommendation on a set of principles that did not include four provisions to which the United States and other countries strongly objected. These were provisions (a) banning war propaganda in space; (b) restricing space activities to States; (c) requiring advance international consultation and agreement on national activities which might in any way hinder the exploration or use of outer space; (d) and condemning the use of satellites "for the collection of intelligence information." The Soviet Delegation also insisted that a declaration on general principles must take the form of an international treaty or agreement,

whereas the United States and others, believing a treaty to be premature, wished to see the general principles incorporated into a General Assembly resolution.

The full committee met from September 9 to September 13 to consider the reports of its two Subcommittees. It approved the recommendations of the Scientific and Technical Subcommittee. It also noted that as a result of the work of its Legal Subcommittee and subsequent exchanges of views, there had been a narrowing of differences on legal questions and expressed the hope that a wider consensus might be achieved by the time the General Assembly considered the Committee's report.

In accordance with the request of the U. N. Committee, the United States continued negotiations with the Soviet Union and with other Members of the Committee on legal matters. The negotiations yielded agreement on a declaration of legal principles and on the desirability of preparing international agreements on liability for damage caused by objects launched into outer space and on assistance to and return of astronauts and space vehicles. The Soviet Union abandoned its insistence that the declaration of legal principles include the four provisions which had obstructed agreement in the spring and also agreed that the declaration should be in the form of a General Assembly resolution rather than a treaty. The Outer Space Committee on November 22, 1963 unanimously decided to submit to the General Assembly an agreed text.

The Political Committee of the General Assembly adopted by acclamation the resolution containing the declaration of legal principles on December 5, 1963. The resolution was subsequently adopted unanimously in plenary session on December 13, 1963.

The United States and all other members of the U. N. Space Committee except Albania co-sponsored in the General Assembly a second resolution approving the recommendations endorsed by the Space Committee on scientific and technical cooperation; encouraging the programs of the World Meteorological Organization and the International Telecommunication Union in the fields of satellite meteorology and communications, respectively; and calling upon the Committee to arrange for the preparation of draft international agreements on liability and assistance and return. The Political Committee adopted this resolution by acclamation on December 5, 1963, and the General Assembly approved the resolution unanimously in plenary session on December 13, 1963.

The U. S. Ambassador to the United Nations opened the Political Committee's discussion of the two resolutions on December 2, 1963 with a major address. In this address he outlined progress toward freedom, peace, law and cooperation in the field of outer space. The Ambassador recalled that "President Kennedy proposed before the General Assembly last September to explore with the Soviet Union opportunities for working together in the conquest of space, including the sending of men to the moon as representatives of all of our countries." The Ambassador stated: "President Johnson has instructed me to reaffirm that offer today."

In response to General Assembly Resolution 1721 (XVI), the United States has continued to register with the U. N. Secretariat all United States objects launched into orbit or beyond since mid-February, 1962. In a letter of June 6, 1963 to the Secretary-General of the United Nations, our Ambassador called attention to the failure of the Soviet Union to include in its registration data submitted to the United Nations a number of Soviet space vehicles launched into earth orbit.

The World Meteorological Organization undertook several significant steps to implement General Assembly Resolutions 1721 (XVI) and 1802 (XVII) at its Fourth Congress in Geneva in April. A comprehensive study was initiated looking toward the improvement of the worldwide weather system, including the use of both satellite and conventional data. Member States were urged to cooperate in this study. In addition a WMO Advisory Committee of twelve highly qualified scientists and experts was established on operations, research and training aspects of meteorological activities and the atmospheric sciences.

The Extraordinary Administrative Radio Conference on Space Communications held under the auspices of the International Telecommunication Union in Geneva in October and November allocated frequency bands for space communications. The work and results of this conference are dealt with below. Following the completion of this Conference, President Kennedy issued a statement observing that "This Government and the United States Communications Satellite Corporation can now take practical steps, in cooperation with other governments and foreign business entities, to develop a single global commercial space communications system. It continues to be the policy of the United States that all countries which wish to participate in the ownership, management and use of this system will have an opportunity to do so."

BILATERAL AGREEMENTS AND OTHER INTERNATIONAL ACTIVITIES

In the spring of 1963 a senior NASA official met again with a senior representative of the Academy of Sciences of the U. S. S. R. to develop the broad steps to be taken to implement the bilateral technical agreement on cooperative space projects which had been reached between NASA and the Soviet Academy in 1963, i. e.: (1) the coordinated launching of meteorological satellites and the exchange of weather data from them; (2) a joint effort to map the magnetic field of the earth by means of coordinated launchings of geomagnetic satellites and related ground observations; (3) cooperation in the experimental relay of communications via an ECHO satellite.

These meetings resulted in a Memorandum of Understanding which was approved by NASA and the Soviet Academy on August 1, 1963. The U. S. representative on August 23, 1963, advised the Soviet representative that NASA was ready to proceed with the implementation of these projects and urged early action. He designated the American officials who would serve on working groups to bring the projects to fruition, and suggested detailed courses of action for each of the three projects. Further progress awaits action by the Soviet Academy.

In his address to the eighteenth General Assembly of the United Nations the President proposed to explore with the Soviet Union opportunities for working together in the conquest of space, including the sending of men to the moon as representatives of all our countries. As a means of accomplishing this objective he further suggested that scientists and astronauts of all the world band together to eliminate duplications of research, construction and expenditures necessitated by lunar exploration.

The Department undertook bilateral negotiations with a number of countries on items ranging from support of NASA programs to arrangements for communications satellite demonstrations.

In support of NASA programs the Department commenced negotiations with Spain for a deep space instrumentation facility to be located near Madrid. At the close of the